

HW 3 - Synthetic Division and Remainder Theorem

Name Key Spring 2017

Divide using Synthetic Division.

1.  $(x^3 - 8x^2 + 17x - 10) \div (x - 5)$

$$\begin{array}{r|rrrr} 5 & 1 & -8 & 17 & -10 \\ + \downarrow & & 5 & -15 & 10 \\ \hline & 1 & -3 & 2 & 0 \end{array}$$

$$x^2 - 3x + 2$$

3.  $(-2x^3 + 15x^2 - 22x - 15) \div (x - 3)$

$$\begin{array}{r|rrrr} 3 & -2 & 15 & -22 & -15 \\ + \downarrow & & -6 & 27 & 15 \\ \hline & -2 & 9 & 5 & 0 \end{array}$$

$$-2x^2 + 9x + 5$$

5.  $(x^3 + 2x^2 + 5x + 12) \div (x + 3)$

$$\begin{array}{r|rrrr} -3 & 1 & 2 & 5 & 12 \\ + \downarrow & & -3 & 3 & -24 \\ \hline & 1 & -1 & 8 & -12 \end{array}$$

$$x^2 - x + 8 - \frac{12}{x+3}$$

7.  $(x^4 - 5x^3 + 5x^2 + 7x - 12) \div (x - 4)$

$$\begin{array}{r|rrrrr} 4 & 1 & -5 & 5 & 7 & -12 \\ + \downarrow & & 4 & -4 & 4 & 44 \\ \hline & 1 & -1 & 1 & 11 & 32 \end{array}$$

$$x^3 - x^2 + x + 11 + \frac{32}{x-4}$$

Use the Remainder Theorem to find  $P(a)$ .

9.  $P(x) = 3x^3 - 4x^2 - 5x + 1; a = 2$

$$\begin{array}{r|rrrr} 2 & 3 & -4 & -5 & 1 \\ + \downarrow & & 6 & 4 & -2 \\ \hline & 3 & 2 & -1 & -1 \end{array}$$

$$-1$$

11.  $P(x) = x^3 + 6x^2 + 10x + 3; a = -3$

$$\begin{array}{r|rrrr} -3 & 1 & 6 & 10 & 3 \\ + \downarrow & & -3 & -9 & -3 \\ \hline & 1 & 3 & 1 & 0 \end{array}$$

$$0$$

**Must ÷ EVERYTHING by 2**

2.  $(2x^4 - 3x^3 - x + 2) \div (2x + 1)$

$(x^4 - \frac{3}{2}x^3 - \frac{1}{2}x + 1) \div (x + \frac{1}{2})$

$$\begin{array}{r|rrrrr} -\frac{1}{2} & 1 & -\frac{3}{2} & 0 & -\frac{1}{2} & 1 \\ + \downarrow & & -\frac{1}{2} & 1 & -\frac{1}{2} & \frac{1}{2} \\ \hline & 1 & -2 & 1 & -1 & \frac{3}{2} \end{array}$$

$$x^3 - 2x^2 + x - 1 + \frac{3}{2x+1}$$

4.  $(3x^3 - 2x^2 + 1) \div (x - 2)$

$$\begin{array}{r|rrrr} 2 & 3 & -2 & 0 & 1 \\ + \downarrow & & 6 & 8 & 16 \\ \hline & 3 & 4 & 8 & 17 \end{array}$$

$$3x^2 + 4x + 8 + \frac{17}{x-2}$$

6.  $(x^4 + \frac{5}{3}x^3 - \frac{2}{3}x^2 + 6x - 2) \div (x - \frac{1}{3})$

$$\begin{array}{r|rrrrr} \frac{1}{3} & 1 & \frac{5}{3} & -\frac{2}{3} & 6 & -2 \\ + \downarrow & & \frac{1}{3} & \frac{2}{3} & 0 & 2 \\ \hline & 1 & 2 & 0 & 6 & 0 \end{array}$$

$$x^3 + 2x^2 + 6$$

**Must ÷ EVERYTHING by 3**

8.  $(6x^3 + 2x^2 - 11x + 12) \div (3x + 4)$

$(2x^3 + \frac{2}{3}x^2 - \frac{11}{3}x + 4) \div (x + \frac{4}{3})$

$$\begin{array}{r|rrrr} -\frac{4}{3} & 2 & \frac{2}{3} & -\frac{11}{3} & 4 \\ + \downarrow & & -\frac{8}{3} & \frac{8}{3} & -\frac{16}{3} \\ \hline & 2 & -2 & 1 & \frac{8}{3} \end{array}$$

$$2x^2 - 2x + 1 + \frac{8}{3x+4}$$

10.  $P(x) = x^4 - x^3 + 3; a = \frac{1}{2}$

$$\begin{array}{r|rrrrr} \frac{1}{2} & 1 & -1 & 0 & 0 & 3 \\ + \downarrow & & \frac{1}{2} & -\frac{1}{4} & -\frac{1}{8} & -\frac{1}{16} \\ \hline & 1 & -\frac{1}{2} & -\frac{1}{4} & -\frac{1}{8} & \frac{47}{16} \end{array}$$

$$\frac{47}{16}$$

12.  $P(x) = 2x^4 - 9x^3 + 7x^2 - 5x + 11; a = 4$

$$\begin{array}{r|rrrrr} 4 & 2 & -9 & 7 & -5 & 11 \\ + \downarrow & & 8 & -4 & 12 & 28 \\ \hline & 2 & -1 & 3 & 7 & 39 \end{array}$$

$$39$$